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West Europe Report

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CONTENTS

VACCINE AGAINST HEPATITIS MADE WITH E. COLI

Rome SCIENZA & VITA NUOVA in Italian Feb 81 pp 8-9

[Article by M.J.: "A Vaccine for Hepatitis"]

[Text] Once again, one of the few big companies in the world that conduct research in the field of bacterial manipulation has announced a new conquest. This time it is the Biogen Corporation, which, in collaboration with the University of Edinburgh, is involved in production of a vaccine against hepatitis B "manufactured" from the common bacterium Escherichia coli.

The news is particularly important since there have not, to date, been any effective weapons available against this kind of hepatitis, the most dangerous type. The biggest difficulty in preparation of the vaccine lies, in this case, in the impossibility of cultivating the virus in the laboratory--that is, outside an animal organism.

The method heretofore adopted consisted in extracting the viral particle (HBsAg, the so-called "Australia antigen") from carriers of the disease, in deactivating it, and in injecting it into the subjects to be protected. The clinical tests made on patients have given excellent results, as was recently announced, but the system adopted has one big disadvantage: the researchers and laboratory personnel are exposed to serious risks of infection.

But by adopting the modern technique of bacterial recombination, one can easily keep those engaged in the work from coming into contact with infectious particles, as is explained by Prof Kenneth Murray, head of the Department of Molecular Biology of the University of Edinburgh. The technique adopted consists in isolating the gene which in nature confers on the virus the capacity to produce the antigen that is found on the outside surface of its involucrum. The antigen is that part which enables the immune system of the afflicted subject to recognize the virus and to combat it. The isolated gene is then transferred into the body of an inoffensive bacterium (the E. coli normally live in the human intestine). The microorganism, thus "programmed," synthesizes one more substance than what it makes for its own necessities in nature. The manipulated bacterium reproduces with extreme rapidity, offering the possibility of producing the antigen in laboratory conditions and in large quantities. In France, though, the researchers of the Pasteur Institue of Paris have just recently achieved another important result: they have succeeded in isolating a new hepatitis virus, in addition to the already known "A" and "B": the "No 3." It is the agent considered responsible for the type of infection--the most frequent one--that is contracted through a transfusion. The "No 3" virus had been "hunted" for some time.

BIOTECHNOLOGY

REPORT DEFINES PRIMARY BIOTECHNOLOGICAL INTERESTS

Paris L'USINE NOUVELLE in French 12 Feb 81 pp 51-52

[Article by Paul Delun]

> [Text] Bio-industry is giving rise to many expectations. The Pelissolo report defines which sectors will be involved. But time is pressing, and we must get to work on it starting today...

On 5 August 1980, Mr Raymond Barre asked Jean-Claude Pelissolo, former Polytechnic student, chief engineer of armament and, until then, director of electronic and information-systems industries, for a report on biotechnologies. December 1980: mission accomplished. It has already had some consequences: four pilot projects were recently selected in the Council of ministers. They deal with the production of synthetic fuels, the production of proteins for animal feed, with a new impetus to be given to the French plant seed industry and, finally, with immunology.

This haste--Jean-Claude Pelissolo makes this very clear--reflects an impatient waiting for miracles from bio-industry, which will doubtless be disappointed. And also the fear that France, failing to participate in time in a race that has hardly begun, will suffer irremediable delays. The train of information processing did not pass by twice: failing to climb aboard in time, we must forever run behind!

Clearly, precisely, the Pelissolo report describes what can be a new and exciting branch of industry. It also proposes a plausible calendar to satisfy this new national priority. Indeed, until now, bio-industry as such does not yet exist.

We find only some sectors of industry using--or capable of using--the tools of biotechnology. It is therefore necessary to develop and structure at the same time! It is necessary to define the routes of basic research and to identify the industries involved. Seven have been registered: health, agriculture, agro-feeds, energy pollution treatment, ore extraction...Jean-Claude Pelissolo emphasizes, "Biotechnology will not reach maturity for twenty years." According to a study by the SEMA the total world turnover in all its divisions could reach Fr 170 billion in 1990, and Fr 400 billion at the end of the century.

Men to Train, Means to Find

Twenty years is a long time for impatience and awaiting the spectacular. It is very little time to prepare for and develop a new branch. The State must, starting now, at home, take some essentially multidisciplinary measures to train men, open up jobs, and furnish the necessary means.

It must above all articulate the procedures between basic research and industrial predevelopment. In other words, it must create a good administration and choose policies well. That is doubtless, next to biotechnology, bio-industries and their fate, one of the subjects for meditation--and for organization--that this report proposes to us. In our country, it also poses a problem itself.

9508
CSO: 3102

HEAD OF HOECHST INTERVIEWED ON GENETIC ENGINEERING

Duesseldorf WIRTSCHAFTSWOCHE in German 12 Sep 80 pp 46, 48-49

[Interview with Hoechst Chairman Dr Wolfgang von Poelnitz by Rainer Burkhardt; time and place not given]

[Text] [Question] Dr von Poelnitz, more and more reports of success are reaching us from the United States concerning progress in commercially interesting areas of genetic engineering. The Japanese are becoming heavily involved in genetic surgery. The French and British are pushing these areas. Where does the German chemical and pharmaceutical industry stand?

Von Poelnitz: In genetic technology we at Hoechst stand by the saying: One can peel only one potato at a time. Initially we have consciously restricted ourselves to tackling the production of insulin and interferon by this means.

[Question] And when can you be expected to develop other fields of application in genetic engineering?

Von Poelnitz: We will proceed to these new areas only after we have been successful in these difficult affairs, that is, only when we can produce insulin and interferon in marketable quantities. Of course that can take 3 to 5 years, but we will be learning in the process. The genetic engineering know-how generally opens up for us the possibility of producing in larger quantities say proteohormones--protein hormones such as produced by the hypophysis or diencephalon--and other physiologically, pharmacologically, and also therapeutically significant human albumin.

[Question] Possibly Hoechst is above the industry average in these activities. But there are authorities who believe that the affected German companies recognized the importance of genetic engineering too late, and that they are still too reserved. Is enough really being done now?

Von Poelnitz: Last year Hoechst invested DM 456 million in pharmaceutical research alone, and this year it will be half a billion. Remember that we deal with practically all of the utilization areas of medicine. We invest 15 to 20 percent for basic research, including research in genetic technology. Although we are actually already beyond basic research, quite clear goals are recognizable, for example with insulin. We cackle only after the egg has been laid, and not before. We have

already been working quietly for several years in this area, because one should not raise hopes prematurely. And to vindicate the honor of the German industry: I know of at least four other companies involved with genetic technology--in other fields of interest. I believe that something will be heard from there in the foreseeable future.

[Question] A competitor, namely Eli Lilly, the world's largest insulin producer, seems to be farther along in regard to insulin from unprogrammed bacteria. For $40 million they are already building production facilities for larger quantities.

Von Poelnitz: But they have just now begun clinical testing. Also it is not so easy to go from the lab to large-scale production. But we're not standing still either. Two 300-liter fermenters for genetic technology are already under construction. We want to conduct the first large-scale technical experiments for bacterial insulin there, as soon as the Safety Commission gives its approval.

[Question] You are thereby entering a magnitude where a waiver is still needed, according to the current safety guidelines of the Federal Ministry for Research and Technology. Won't that hamper development in relation to international competition, especially when requirements are being relaxed in the United States?

Von Poelnitz: I must emphasize that we don't want to take any risks. That is valid for genetic engineering as well as for pharmacy in general and for plant protection. After all our employees would be the first to be affected by a catastrophe. The strict requirements in genetic engineering result from the fact that several years ago scientists, especially in the United States, reached a point where they were not yet able to perceive the possible consequences. They thought of colossal catastrophe scenarios and called for safety regulations, which were thereupon enacted in the United States and here. Meanwhile one has more experience and knows that the risk is very small. And therein is the difficulty in bringing home this about-face to the agencies. Of course we will do everything humanly possible, starting with the installation, to prevent some injury from occurring. In my opinion the Americans are on a healthy middle course. We must find it in the FRG as well, in order not to impede progress.

[Question] And would the genetic engineering safety law, which is in the works in the Federal Research Ministry, be such a great obstacle?

Von Poelnitz: We have nothing against such a law. But as you know our German thoroughness has a tendency toward perfectionism. I warn against laws that cannot be administered, that in the end make work impossible. But I hope that reason and the advice of the experts can prevent that.

[Question] Scientists who have a grasp of genetic engineering, and who can apply it at an industrial level, are not produced overnight. On the other hand, human resources are wasted, because in part young biochemists and microbiologists are so frustrated over the prospects of finding a position at a university or research establishment that after graduation they practice unrelated occupations, perhaps as clinicians.

Von Poelnitz: We have no clinic visitor with such qualifications. At least I don't know of any. For example it is presently very hard for us to get physicians. For years we have searched for gut biochemists and microbiologists and found none. Now it is somewhat better. When we find good people we hire them. But of course we cannot do that unlimitedly. Over 50 percent of our research expenditures are personnel costs.

[Question] Aren't we in Germany too rigid, possibly because only the established companies with cumbersome structures concern themselves with this matter? There is a completely different dynamic back of it when even in a small development firm biochemists and microbiologists team up, financed by investors willing to take risks, as in the United States. Why not here too?

Von Poelnitz: I would suppose that that has legal and finance political causes. The natural scientists working at the university of in Max-Planck-Institutes use public finds or grants from foundations, for example from the Volkswagenwerk Foundation. And when discoveries are made there, then these institutes and organizations will have to have their say too. Hoechst has hundreds of cooperative contracts with university institutes and scientists. For a long time we have been especially interested in teamwork and the exchange of ideas with universities and research establishments. To be sure much has been said about genetic engineering companies such as Biogen, but so far there is nothing really tangible in the way of products. For example I have not seen a trace of Biogen-interferon.

[Question] But nonetheless large oil and pharmaceutical concerns have come in, who certainly expect something for themselves. Doesn't one rather have cause to be concerned about bringing on unwelcome competition through the concentration in genetic engineering knowledge and experience? Xerox and Texas Instruments also started out quite small.

Von Poelnitz: These considerations are certainly not important to us, and heretofore those have strictly been companies involved in the exploitation of know-how. When such a company exists, then why not cooperate with it?

9746
CSO: 3102

RESEARCHERS DEVELOP PLASTICS FROM PLANT MATERIALS

Zurich CHEMISCHE RUNDSCHAU in English 21 Jan 81 p 5

[Article by Staniforth Webb]

[Text]

A research team at the University of Manchester's Institute of Science and Technology is developing new plastics from raw materials which are not based on petrochemicals.

For the first time ist has been shown that plastics with a very broad selection of properties can be made from raw materials obtained from plants instead of petrochemicals. Led by Dr John Stanford, a team at the Polymer and Fibre Science Department of UMIST (University of Manchester's Institute of Science and Technology) has won a grant of more than £100 000 from the Wolfson Foundation to develop the new plastics, starting from the substance from which the walls of all plant cells are mainly constructed, cellulose.

This work opens up the possibility of producing materials ranging from soft foams to ultra-hard substances out of agricultural surpluses and wastes such as leaves, corn stalks and bagasse (sugar-cane waste). Because plants use solar energy to make cellulose, these are renewable resources. Indeed, the new materials have already been nicknamed "Sunpowered plastics".

The rising price of oil is, of course, the main reason for the research. Most of the world's plastics today are made from various fractions of petroleum and their cost has, on average, doubled over the past two years. Moulding plastics into finished articles uses up a lot of energy, too, so the UMIST team is also working to develop improved versions of a process known as Reaction Injection Moulding (RIM).

Rapid

In conventional moulding processes, plastics are stored as solid granules which are subjected to high, energy-expensive temperatures and pressures when they are moulded into finished products. In RIM, the plastics are stored as liquids which are injected into moulds in a much more rapid process at low temperatures and pressures, thereby saving a lot of expensive energy.

The equipment now being developed for RIM is cheaper and more compact than that already in use. This, coupled with the plan to use agricultural wastes, means that UMIST's work is of special interest to many developing countries. Dr Stanford estimates that plastics made in this way will be ready for commercial use within about three years.

It is not economical to replace plastics by wood and metals, because the prices of those materials is rising even faster. In fact, one effect of the rising cost of energy is to encourage the use of plastics in components for motor vehicles, because their relative lightness saves a worth-while amount of fuel. So new markets are being created for cheap plastics. But, over the next 10 to 20 years, oil-based plastics will undoubtedly become too expensive for such applications.

Gas and coal are the other two sources of raw materials for hydrocarbon-based plastics but the price of natural gas may be expected to rise at roughly the same rate as that of oil. Coal reserves will last far longer, but there too prices will rise as oil becomes scarce. Furthermore, the processes for separating the wanted hydrocarbons from coal and making them into pro-polymers (the building blocks out of which the long-chain polymer molecules that make up plastics are assembled) use even more energy than do processes using oil as the starting point. So there is an obvious need to develop the new materials.

Pro-Polymers

Some plastics are, of course, already made on a large scale from cellulose acetate, but their range of properties has been restricted. UMIST's development greatly expands it. The process involves first treating the organic raw materials with organic solvents to extract the cellulose and then using cellulases, cellulose-dissolving enzymes, to break down the cellulose into smaller molecules known as cellodextrins. One example is glucose. Up to 99 per cent of the cellulose in the raw material can be made into cellodextrins in this way.

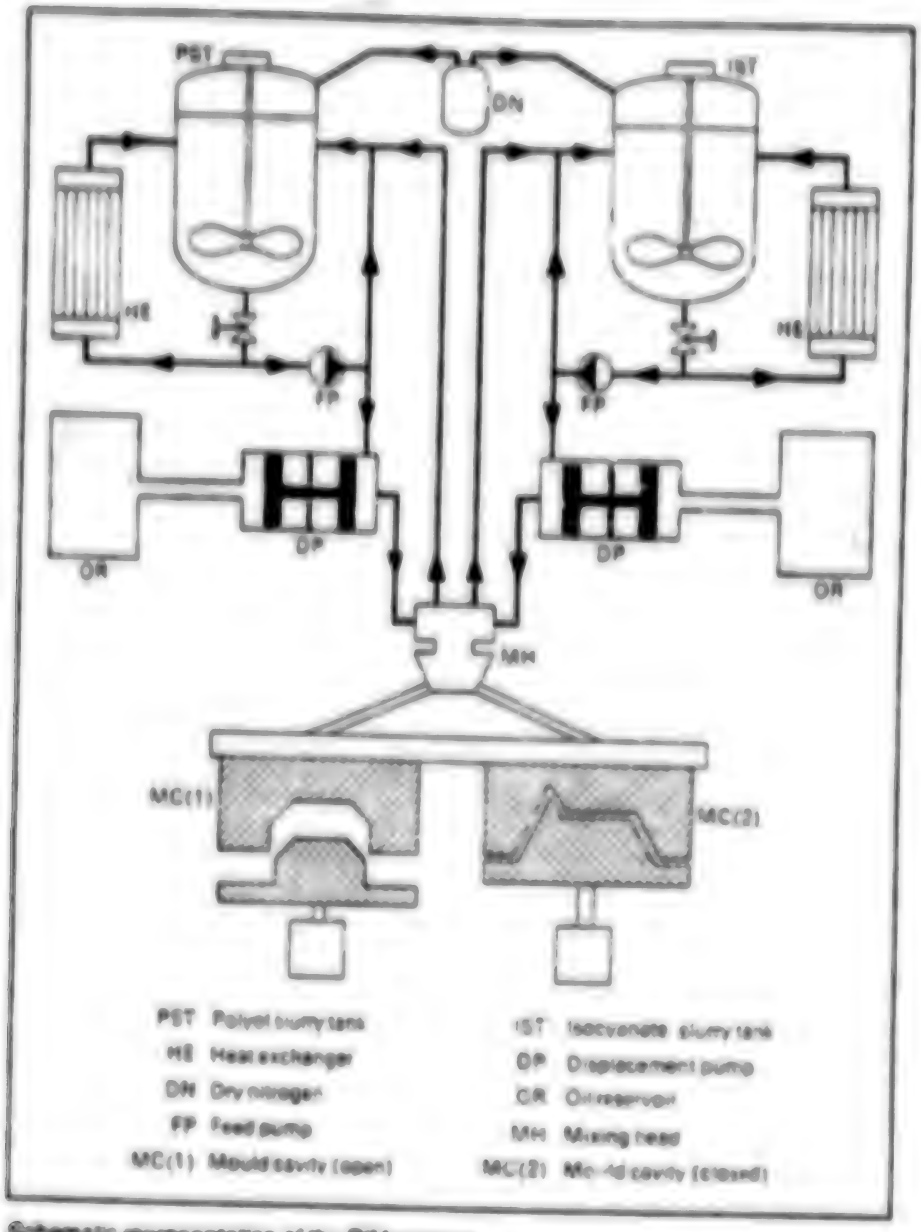
The next, vital step is to convert the cellodextrins into a range of pro-polymers, upon which the properties of the plastics depend. Dr Stanford's team has found ways to make a large variety of pro-polymers from cellodextrins by a process known as chain extension. It leads to a large series of polymers, in turn giving a selection of plastics with many different properties. This is the particular development now being exploited.

Once polymers have been synthesized they have to be formed into useful articles by some process such as injection moulding, compression moulding, extrusion, blow-moulding or vacuum-forming.

	Reaction injection moulding	Injection moulding
Material cost (£/kg)	0·88	1·48
Specific gravity (g/cm³)	1·05	1·22
Vol. cost adjustment (£/000 cm³)	0·82	1·78
Minimum thickness (mm)	4	3
Cost adjustment	1·23	1·78
Reject rate (per cent) *	5*	1
£ adjustment	1·29*	1·78
Total material cost for 6000-cm³ part (£)	7·75	10·68
Labour/part (£)	1·89	1·62
Paint/part (£)	0·89	0·56
Primer/part (£)	0·176	0·176
Total cost for finished part (£)	10·41	13·04

*Advances in RIM technology since 1976 have led to a lower reject rate which now compares favourably with that of injection moulding.

Compared costs of car bumper produced by RIM and by conventional injection moulding.



Schematic representation of the RIM process.

Each requires temperatures of about 200 to 300 °C, to soften the polymer granules. They also need very high pressures, around 10000 pounds per square inch (roughly 70 megapascals), to make the highly-viscous, softened plastic flow into the mould. RIM moulds in a single process from a liquid pro-polymer, thereby producing large, complex structures quickly and cheaply.

Savings

RIM saves energy in several ways. Because articles are moulded directly from the pro-polymer, which is polymerized at the same time as it is being moulded, all the stages involved in making and storing the polymer are cut out. There is no need for the energy normally used to soften the stored polymer, for the pro-polymer is stored as a liquid and the moulding is done at low temperatures

and pressures. The liquid is held in one tank and the polymerizing chemical in another; when moulding is to take place, the two are pumped at controlled rates to a mixing head and through it into the mould, where they react to form a moulded product after only a few seconds. Typical temperatures of operation are 55 to 70 °C and typical pressures about 1500 to 3000 psi (about 10 to 20 megapascals). Only quite small equipment is needed for moulding small or large parts rapidly, which means a saving in floor space and less capital cost.

If plastics come into general use for components such as car door panels, their properties will need to be improved by filler materials to add stiffness, strength, and resistance to impact. With this in mind, Dr Stanford's group is developing equipment to enable filler materials to be introduced during the RIM process. Such a technique, first developed in the USA, is known a Reinforced Reaction Injection Moulding (RRIM). The process being developed at Manchester enables reinforcing materials to be introducted into the finished product as part of the single-stage moulding process, thereby saving still more energy.

In the motor industry, the new materials will offer weight savings and better corrosion resistance compared with steel, as they will be cheaper than aluminium and have better resistance to damage. Applications in other industries should follow. In building and construction generally, and in marine and aerospace engineering. Beyond this, John Stanford foresees the production of smaller moulded articles, such as domestic appliances and sanitary ware. Because of the wide implications of the work, a number of British companies are taking a strong interest in its progress. They include British Leyland, with an eye on vehicle components, Tate and Lyle, with a view to finding new uses for surplus sugar, beet and bagasse, and Blue Circle and Pilkingtons who provide reinforcing filler materials for plastics.

Eventually, the fillers themselves may be made from renewable resources. At Brunel University, near London, Dr Gerry Griffin has shown that starch granules extracted from ordinary crop plants, including rice and maize, can be used as fillers for most commonly-used plastics to make up to 40 per cent of their volume without impairing the properties of the materials; in some ways they improve them, notably in strengthening resistance to impact. Dr Griffin now directs a new research centre where work is going on to develop biodegradable plastics incorporating starch. He is also looking into the properties that filler starches extracted from various crops confer on various plastics. As with Dr Stanford's work, the implications of large-scale use of starch from ordinary crops, many of them grown on land unsuitable for other agricultural uses, is obvious to developing countries. (Spectrum 169/1980)

CSO: 3102

CHEMISTS SAY CHEMICAL INDUSTRY STRATEGIC FOR FRANCE

Paris AFP SCIENCES in French 5 Feb 81 p 41

[Text] Paris--Fine chemistry is expected to become a "strategic industry." The chairman of the Union of Chemical Industries (UIC), Mr Jean-Claude Achille, said on 4 February that the union wants the strategic nature of fine chemistry in the French economy to be recognized, just as biological industry, for example.

A report to this effect was submitted by the UIC to public authorities and the experts expect a decision "before too long." They have actually pointed out the contribution of fine chemistry to industries which have already been selected by CODIS (Guidance Committee for Strategic Industries).

Despite the poorer results in 1980, French chemists are still relatively optimistic about the future of their sector, which in their opinion still has its assets, and expect an improvement in 1981.

French chemicals, the second industrial sector after machinery with a turnover of Fr 165 billion in 1980 (as opposed to Fr 140 billion in 1979), actually had a year that was better than its neighbors: the volume of production declined only 1 percent last year, whereas the decline was as much as 3 to 6 percent in Belgium, the FRG and Great Britain, for example.

The world's third largest exporter, the French chemical industry has encountered the competition of foreign imports, mainly from the United States: imports (Fr 44 billion in 1980 as opposed to Fr 38 billion in 1979) rose by 16.2 percent, whereas exports increased only 12.2 percent (from Fr 49 to 55 billion), or a slight decline in volume. As a result, the positive balance of trade dipped slightly to 11 billion, as opposed to 11.2 billion a year ago.

French chemists expect an increase of approximately 2 percent in 1981, however, due particularly to a recovery in the second half of the year and they do not expect a perceptible decline in their numbers this year. They believe that their sector will have to overcome two obstacles in the future: the low amount of investments (which remained stagnant in 1980 at Fr 5.2 billion) and the problem of raw materials, which mainly affects heavy chemistry.

11,915
CSO: 3102

OPTICAL STORAGE DISC HAS TEN TIMES TRADITIONAL DISC CAPACITY

Duesseldorf WIRTSCHAFTSWOCHE in German 30 Jan 81 pp 63-65

[Article: "Disco Fever in Electronic Data Processing (EDP)"]

[Text] For the first time in the history of computer technology the Europeans seem to be in the lead. In Eindhoven Philips has developed an extremely efficient and reasonably priced storage disc which opens up totally new possibilities for EDP use.

Whenever the subject was computers, the Europeans always looked with envy at the developments which were taking place in the laboratories of the Americans and Japanese. For the first time, now, the engineers in the Old World seem to have found success.

With a sensational base innovation Philips engineers penetrated the technology monopoly of the Americans, which has been jealously guarded for decades.

Basic researchers at the Dutch electro-giant created the optical storage disc as a companion development to the video disc, the sale of which is starting to roll in the United States. Hidden behind this concept is a technology which strongly stimulates the fantasies of computer users, of EDP and office machine manufacturers.

Peter Reichert, German-American and market researcher with Mackintosh Consultants in Darmstadt, boasts that "in respect to its importance the storage disc must be equated with the discovery of the microprocessor." Datev chief Heinz Sebiger, master over one of the most modern German computer centers, also sees "fantastic possibilities." Sebiger has already announced himself as a pilot user and derives "enormous pleasure" from being able to show the Philips engineers an outstanding example of the use of the new storage units.

Harro D. Welzel, manager of the German Philips Data Systems Ltd. in Siegen proudly proclaims that "every week there are new interested parties." The new storage disc is to enter the test phase in 1982 in selected pilot applications. Welzel confidently adds that "only users who are prepared to invest in this technology on their own will be considered."

Whether as mass storage for gigantic data archives, whether as an ultramodern office system, whether as a central medium for an electronic mail system--in the last analysis Weisel predicts that "as a manufacturer of such an invention one cannot at all foresee what conceivable uses actually exist."

There are now 8 years of hard research work behind the new mass medium, which easily consumes up to one-half million typewritten pages, is no larger than a normal long-playing record and, in the process, stores more data by far than IBM's largest magnetic disc for computers. In the terminology of the EDP experts this amounts to 1.25 billion bytes, roughly 10 times the traditional discs--and that at a unit cost of about DM800.

The actual heart of the Philips development is a completely new laser on a semiconductor base. The researchers reduced the equipment that was 20 meters long to the size of match box. This miniature laser is required to read and write the information which is regularly burned into the roughly 45,000 grooves of the disc. The price for such a playback device is quite comparable to the costs for a magnetic disc drive.

Yet future customers can do very little with just the hardware alone. The high component density and the highly integrated laser are only one side of the superdisc.

In addition to the in part new-fangled devices for the input and output of the stored information the developers of the system mainly need software. Product manager Klaus-Dieter Ludwig says that "Philips will surely still have to invest 50 man-years."

The split-second retrieval of stored information, which can be recalled via a screen, alone requires an extremely costly computer program. This so-called "retrieval" software is the key to the entire system.

New data collecting systems must be developed because manual input using alphanumeric keyboards is slow and subject to error. Weisel reports that "our laboratories are working on a scanner that can convert pictures to digital information. To do this a piece of paper covered with writing is placed on the special equipment, and the automatic machine resolves the document into picture points in seconds whereby the information can be fed out in the original form again. Like all large computer companies the Philips electro-giant is working vigorously on an audio response unit, speech recognition and language input. Here too, the manufacturers are still facing a gigantic area for development.

"The current situation is extremely similar to the early years of rapid development in EDP." This is how ELECTRONICS, a U.S. technical journal, characterizes the new billion-mark market of electronic document storage whose key technology is the optical storage disc. In 1990 market volume is estimated to be over DM3 billion. The trade journal prophesizes: "In 5 years they'll be off and running. Whoever joins in now can reap enormous benefits."

Although digital optical recording (DOR)--the technical designation for the storage disc--is presently still totally experimental, the groundwork is being

laid now for its great future. Welzel explains the market strategy of the ambitious Dutch electromultis in this way: "With a technology like the optical storage disc we would be making a mistake if we tried to market it all alone. It is very important for this technology to have a broad base."

Thus, Philips has already initiated the transfer of know-how via cross-licenses "with large firms which have something to offer" (Welzel). The Dutch giant wants to produce the storage disc for other manufacturers on an OEM basis. The original equipment manufacturer business, which is very popular in data processing, will enable Philips to manufacture the miracle disc in large numbers by the mid-1980's. In this connection the partners are permitted to offer under their own name to the end user the product bought from Philips and, for example, with software that they developed.

Welzel says: "In the first phase a certain kind of specialization will develop in the market." On the basis of the mass product manufactured by Philips the OEM customers can establish themselves as experts in certain areas of application. Welzel says: "Given the abundance of use possibilities it will surely not be hard for us to leave certain areas of use for the OEM customer."

With this strategy Philips wants to create within a short time an unchallengeable hardware standard in the future market. Declining prices with increasing quantities would open the market up faster than if every competitor had to first develop the technology and then do the production himself in small quantities. And: "In this we are dealing with a very complex technology which cannot be imitated so quickly. That requires enormous know-how. And it cannot simply be duplicated."

Welzel sees an important market where "people frequently use information in large quantities--take for example Teletex as a transport medium": The input of any given texts via a normal typewriter keyboard, transported via postal lines and output of the information at any given place in the FRG on a screen. In this, all transported information can be stored like "files" just as well as on paper. For "texts" which have once been burned into the storage disc can only be "erased" by destroying the disc. Thus, the storage disc is an excellent archiving medium which "has a longer life than paper."

12124
CSO: 3102

STRATEGY TO DEVELOP MICROELECTRONICS INDUSTRY

Rome SCIENZA & VITA NUOVA in Italian Feb 81 p 98

[Article: "From the FAST (Federation of Scientific and Technical Associations) and from the CNR (National Research Council), the Microelectronics Challenge"]

[Text] The big revolution comes from a small, precious chip of silicon: a very few square milimeters on which it is possible to construct, by a unique production process, several tens of thousands of elementary electronic components (transistors, diodes, resistances) already connected with one another to form a complete functional part of an electronic apparatus. The microprocessor revolution is going forward in big steps to transform industrial society, born of the motor of the 18th century, into an information society.

How is Italy responding? Not painlessly. For the national industry in this sector, the promising forecasts of 10 years ago are followed, in 1979, by a domestic microelectronics market which is 80-percent supplied by imported products, which means a trade-balance deficit of 160 billion lire. But a response is also coming from the programs under way and from the declarations and reports prepared by Italian researchers.

If it is true--as Minister of Research Romita has declared--that innovation is not the product of huge investments only, but also of the degree of application and creative capacity of well-prepared researchers, policies of support for the intellectual resources and for the Italian industrial potential are most welcome, and the sooner the better.

A "Report on National Microelectronics" prepared by researchers in public and private agencies and in industry, coordinted for the FAST by Prof Umberto Pellegrini, has studied the technical evolution, the outlooks, and the applications of microelectronics, as well as the employment consequences, the market forecasts, the necessary public support of industry. Beyond the framework of its influence on productive processes, there is no social sector that proves to be excluded from it. We can mention telecommunications, electromedical equipment; agriculture, from irrigation to rationalized stock-raising, even to the food-products chain; public services (health, transport, environmental and land-use control); the videotelephone, teletex, telemedicine. The list could go on. This is why the FAST Report is more than a white paper, it is an instrument for useful approach to action by the government.

As for the CNR, with the Purpose-Directed Data-Processing Project--approved by the CIPE [Interministerial Committee for Economic Planning] in 1979, with financing of 50 billion lire in 5 years--the research is following two lines of technological development that will change our industrial activities and lifestyle in the very near future. The first, as we said, lies in the rapid evolution of microprocessors; the second lies in teleprocessing--that is, the integration of processing with the transmission of information. The central theme of the project is therefore distributed data-processing (composed, that is, of networks of computers, generally microcomputers, connected with one another in different ways), articulated in three subprojects. The first concerns the production sector--that is, processing structures and systems; the second concerns applications in public administration, hence the "demand" for research; and the third concerns the management of industrial processes, with all the implications as regards the quantity and quality of job positions.

The stakes are very big. Leaving the game would mean accepting handicaps of all kinds. Consider just one fact: the microprocessor, invented by an electronics engineer of the American industry INTEL in 1969, had a world market of $60 million in 1975, up to $6 billion in 1980.

11267
CSO: 3102

FIRST SESSIONS HELD TO ASSESS SOLAR PROGRAM

Paris AFT SCIENCES in French 5 Feb 81 pp 45-46

[Article: "Solar Energy: First Sun Sessions"]

[Text] The first "sun sessions" were held in Paris on 4 February 1981 under the chairmanship of Robert Wagner, deputy from Yvelines, who is in charge of the parliamentary "Solar Energy and Biomass" study group.

These sessions brought together several hundred individuals including about 10 deputies. On that occasion Jacques Chaban-Delmas, president of the National Assembly, advocated an energy policy based on "autonomous housing in a conserving society." In this connection the mayor of Bordeaux called for an increase in the credits of COMES (Solar Energy Commission), commenting: "Would it be so unreasonable to endow COMES progressively with means comparable to those of the AEC [Atomic Energy Commission--France] 10 years ago?" while noting that the budget of COMES today represents 8 percent of the AEC's budget 20 years ago.

In 1981 COMES' budget totals 199 million French francs compared to 140 million francs in 1980, but France's aggregate outlays for renewable sources of energy will exceed 1 billion francs, COMES' president, Henry Durand, indicated. Already now 40,000 housing units are slated to be equipped with solar heating equipment between now and next summer, and the opening of 26 solar-heated swimming pools is scheduled for next spring.

In the field of new energy sources, or rather "rediscovered" sources, the secretary of state in charge of research, Pierre Aigrain, estimated that for the time being the direct uses of solar heat in housing were going to predominate. The share of solar energy is "small" with a savings of no more than 8,000 TEP [petroleum equivalent tons] whereas housing consumes some 30 million tons of crude oil, or one-third of France's imports.

Speaking of photovoltaic conversion, Pierre Aigrain indicated that for several years now research in France has been at a very high level. At present it involves near 200 researchers in some 20 laboratories. Well-positioned in international competition, the French industry occupies second place after the United States and exports more than 90 percent of its production of photovoltaic cells. It is the beneficiary, as is seen, of very sustained research and development activity.

In a context of harsh international competition, research on a more economical production of silicon-based photovoltaic cells takes priority. It must include studies on new materials (strips, semicrystals). But it is also necessary to pursue research in nonsilicon-related fields, to press forward in the area of high-yield photovoltaic cells, to proceed with experimentation in real-life situations with major panel assemblies or concentrated prototypes. In this field, basic research, notably in physics, may lead to sudden, unpredictable developments as has already been the case these past few years with the new alternative represented by amorphous silicon.

In France by 1985, Pierre Aigrain also recalled, solar energy will supply 500,000 TEP and biomass, 5 million TEP, according to government projections. Jacques Chaban-Delmas expressed a wish for the creation of a biomass institute, which, he noted, Bordeaux would be ready to welcome.

The head of COMES indicated in this connection that the government was carrying out three programs for the improvement of "green oil," i.e., biomass: The gasohol plan (injection of alcohol into gasoline); methane fermentation (the use of animal waste, notably in a 20,000-head pig sty); and the use of gas-producing substances (3 kg of wood to replace 1 liter of gas-oil).

According to Andre Giraud, minister of industry, who closed the discussion, "France has been able to maintain itself in the vanguard of solar energy producing nations and will continue to do so."

In this way, Minister Giraud responded to the president of the National Assembly, Jacques Chaban-Delmas, in whose view France was in the process of losing the "slight advantage of its headstart" in solar energy to new countries.

The minister of industry also affirmed that the budget of COMES was equivalent to civilian budgetary allocations to the Atomic Energy Commission during its initial years.

France's solar budget, with over 1 billion francs, is "several times the size of the initial French nuclear budgets," Minister Giraud noted. "This order of magnitude enables me to assert to pessimistic individuals that such amounts still allow France to rank second in the world."

2662
CSO: 3102

SOLAR HEAT TOO COSTLY FOR INDIVIDUAL HOMES IN SWEDEN

Stockholm DAGENS NYHETER in Swedish 8 Feb 81 p 5

[Article by Mert Kubu: "Test Houses in Taby Give Clear Result--Solar Heat is Too Expensive in Sweden"]

> [Text] The heat from solar collectors on the roofs of individual houses is entirely too expensive in Sweden. This was proved by experiments with different solar heating systems which were tested in Taby. "It is only dreaming to believe in solar collectors on the roofs of houses," said civil engineer Nils-Eric Lindskoug, head of the large Taby project with 26 different solar-heated houses.

Lindskoug has delivered an oral report to Minister of Housing Birgit Friggebo (liberal). He wants to warn the government against expectations of quick progress with solar heat. Significantly better solutions must be found if it is to succeed. In the beginning of March the results of the experiments at Taby will be published.

Lindskoug believes that the experiments at Taby have had great importance for science. Knowledge has grown, and lessons have been learned from mistakes.

The best results have come from the reference houses. They are well insulated and conventionally heated with direct electricity.

The worst were the different types of solar-heated houses.

Lindskoug, who lives in one of the test houses, said, "The neighbors want the solar collectors removed. They do not produce much. Therefore I will try to help them with that."

Expensive

Solar heat with collectors on the roofs and individual storage tanks is so expensive, even with series production, that the energy cost would be a couple of kronor per kilowatt-hour, according to Lindskoug.

He has pulverizing toilets in his own house. He takes in pre-warmed air through an underground pipe. He is also testing a new, Swedish manufactured heat pump which takes heat from the toilet...

The pulverizing installation did not function especially well. It smelled, and the family complained. Two dry seats were exchanged for two rapid-flushers. The pulverizing box in the cellar had to be pre-heated, then the heat pump connected to it. It did not give much compost. It was also messy to empty. Lindskoug expects that it will probably be 20 years before the pulverizing toilet is perfected.

Data Spy

Besides solar heat they are testing different types of heat pumps, simple heat exchangers, temperature control systems, both airborne and waterborne heat, climate control installations, etc. In Lindskoug's cellar there is a computer system. This records each time the neighbors air out their rooms, what temperature they have, how much energy they are using. The figures are analyzed in kronor per saved kilowatt-hour. The limit of profitability is at about 1.5 or perhaps 2 kronor. Many go far beyond that...

Lindskoug will not reveal the results of the different experiments in figures. That will be known at the beginning of March.

What conclusions does Lindskoug draw from the Taby experiments? Newly constructed small houses should be insulated and sealed well and heated with direct electricity, said Lindskoug. Older houses should be insulated. In houses requiring much energy he believes in heat pumps. He is interested in what the little pump can produce when connected to the air discharged or exhausted from a house. About 5-7,000 kilowatt-hours per year. That is enough to heat the water and a bit more. Lindskoug said that such pumps are cheap to install.

As to solar heat, he has hopes for large projects. Among other projects a test will be started in the spring on a large scale to introduce solar heat into a district heating plant--with new, very advanced solar collectors.

Average

One additional experience can be drawn from Taby. Buyers of test houses were chosen at random from the municipality's waiting list for small houses. Energy enthusiasts were intentionally not selected, but rather average consumers.

There have been many problems, many breakdowns, large and small. About 15 of the most tried homeowners turned sour. One group resorted to a lawyer to obtain a practical and economic settlement.

One of the homeowners, Tord Maunsbach, said, "There have been a great many small breakdowns. A couple of the solar installations were taken out, at a cost of 20,000 kronor each. It is obvious that we are not satisfied."

Unhappy

The homeowners have actually paid somewhat less than half of the extra cost for the alternative equipment. They have signed interest-free loans payable in full at

maturity. A final decision by the government council for building research will be made in 1982 on how large a portion of the costs will be paid by the homeowners. For subsequent experiments construction has been handled differently. At Lambohov in Linkoping the owners of row houses pay exactly the same as for remote heating. The builder and the building research council take the risks for the solar heating installation.

Tord Maunsbach said, "It is necessary and good that there are experiments. I can accept that the things will remain if they want to prolong the tests. But they soon break down, and I do not want to take the risks."

In their house the Maunsbachs have a small model of an "engineer's Christmas tree" with a heat exchanger, climate control, earth heating, large water tank for storing heated water in the cellar, solar heated tap water and solar heated air.

Leakage

Maunsbach said, "We have had leakage in the cellar and in the solar heated pipes in the attic. One of the solar collectors froze and burst. And the paradox is that our neighbors in the reference house, which is conventionally heated, apparently do not use much more energy. There is no particular difference in our electric bills."

It is also not always easy to be pioneers. But pioneers are needed so that development can go forward. Both Linkskoug and Maunsbach agree on that...

Photo Caption: "The dreams of solar energy enthusiasts on the roofs of houses are not economical. I will try to help my neighbors have the solar collectors removed," said Nils-Eric Lindskoug, head of the project at Fladergrand in Taby.

9287
CSO: 3102

PRODUCERS ASSOCIATION, ENERGY USERS PLANTS CREATED

Paris AFP SCIENCES in French 5 Feb 81 pp 47-48

[Article: "Gasohol: Creation of an Association for the Promotion of Energy-Yielding Plants"]

[Text] An association for the production of gasohol from energy-yielding plants (sugarbeets, Jerusalem artichokes, fodder wheat, great reed, sugar sorghum) has been created.

Henri Cayre, representing the sugarbeet growers, and Pierre Poujade, on behalf of the Jerusalem artichoke producers, indicated on 3 February 1981 during a Paris press conference that the "Confederation of Agricultural Producers and Industrial Users of Renewable Energy-Yielding Plants" had just been established. According to its bylaws, the goals of the association are "the promotion, representation, organization, and defense of the professional interests of the producers, processors, and users of renewable energy-yielding plants." Gasohol distribution companies, that is, the oil companies, will be involved with this interprofessional grouping, Henri Cayre explained.

The former director-general of the General Confederation of Sugarbeet Producers suggested that in this way with "gray matter marrying green matter" the sugarbeet growers were making their contribution to the gasohol edifice."

Pierre Poujade, national secretary of the Professional Organization of Jerusalem Artichoke Producers, evidenced his "impatience" when he said: "The government has made some commitments, and they should be kept."

For the former head of the Union for the Defense of Businessmen and Artisans the "battle for energy independence is essential" and "the Jerusalem artichoke will be its spearhead." Pierre Poujade spiritedly took to task the "mandarins of agriculture with their budget-eating officials, general engineers, and guard dogs of the oil producers waiting for me with their axes and opposed to plant-decived fuel."

He added: "Not only could we effect savings but we could use the byproducts of gasohol in place of fertilizers which are expensive by virtue of the petroleum which they contain and which undermine soil and man."

2662
CSO: 3102

DIFFICULTIES FOUND WITH METHANOL-DRIVEN TEST BUS

Stockholm SVENSKA DAGBLADET in Swedish 6 Feb 81 p 6

[Article by Dag Bjerke: "Methanol Bus Difficult to Fuel"]

> [Text] The motors run well, but the auxiliary and fuel systems have at the outset functioned in an unacceptably poor manner on the two methanol-driven buses which have been tested for one year in Stockholm's public transportation system.

On Thursday the methanol company delivered a situation report to the Industrial Council at the end of the first of two planned test years with two originally diesel-powered buses which were converted to combined methanol-diesel power.

The apparatus for carefully measuring the methanol and diesel consumption was not able to tolerate the methanol. After several total losses of power the measuring equipment was removed.

Impurities in the methanol fuel which was delivered by Nynas created such major problems at the outset that discontinuation of the project was considered. The fuel filters became obstructed a total of 18 times, resulting in total breakdowns and necessitating towing.

These problems also made it necessary to empty and clean the fuel systems and tanks several times.

Pump Would Not Tolerate Methanol

A hand-driven pump also proved to be unable to tolerate methanol. It was later exchanged for an electric pump, but that could not be supplied with the correct amount of electricity, which meant new complications and new sources of failure.

Fuel consumption during the 3,000 miles [Swedish mile = 10 kilometers] that the buses have each traveled has been 1.4 liters of diesel oil and 12 liters of methanol per mile.

Considering that methanol contains less energy than the same volume of diesel oil, it can be calculated that the fuel consumption corresponds to about 6.7 liters of diesel oil per mile.

That is somewhat more than is consumed by a normal diesel bus, which seems to be due to the methanol buses weighing 1.5 tons more than normal buses, and different power transmission.

Furthermore it has been shown that methanol buses accelerate better than comparable diesel buses.

The methanol motors' exhaust gases have also been compared with that from normal diesel motors: carbon monoxide, nitric oxides, aldehydes, pyridines, smoke and soot were reduced. Hydrocarbons, mainly in the form of unburned methanol, increased.

Chemically and technically it is very difficult to operate a diesel motor on methanol alone. Diesel motors ignite their fuel by the heat which comes with pressure in the cylinders, spark plugs are not used.

That heat is not sufficient to ignite methanol. Therefore a little diesel oil is sprayed in first. When this is well ignited, then methanol is sprayed in the cylinder. The burning oil serves as a sort of "spark plug" for the ignition of the methanol.

Photo Caption: Two SL [Stockholm Public Transportation Company] buses have for one year obtained 78 percent of their energy from methanol. The remainder has come from diesel oil, which must be used to ignite the methanol.

9287
CSO: 3102

LPG INCREASES IN POPULARITY AS AUTO FUEL

Paris LE NOUVEL ECONOMISTE in French 16 Feb 81 p 47

[Article by Alain Jemain: "The Surprising Success of LPG"]

[Text] They are neither for the show-offs or for the kilometer-eaters. Legal in France for the last 2 years, LPG (liquefied petroleum gas)-propelled cars are outwardly undistinguishible from other cars. They are less powerful and consume more than their gas-propelled competitors, and they cost 4,000 to 6,000 francs more to buy, taxes included. All these drawbacks do not keep their market from increasing rapidly.

It is anticipated that some 80,000 cars with a tank hidden in the trunk and with adapters and safety equipment made invisible under the car will travel French roads by the end of this year. This number will probably increase tenfold before 1985. Italy already has 650,000, the Netherlands 300,000, and Japan 290,000. Privileged users in these countries are the large fleets of public administrations, communities, delivery services, taxicab fleets, and driving schools. Among the French companies which converted to LPG in the last few months are: Darty, Jacquet Bread, Chaffoteaux et Maury, Societe Urbaine de Chauffage (city Heating Company). Among municipalities are Caen, Saint Etienne, Marseilles.

"The advantages are many," explained Mr Daniel Benoist, of French Shell, last week to the Society of Automobile Engineers. "Greater flexibility of use, lower pollution, longer engine life and cleanliness, more economical use of the vehicle." The price of LPT is currently Fr 2.25 on the average (as compared to about Fr 3.50 for regular gas), although consumption is slightly higher (roughly 12 percent more). Citroen already offers LPG versions of its LNA and Acadiane models (modified by Heulies). Peugeot equips its 504, 305, 505 and J9 panel trucks and, since 15 January, Renault equips its R4 utility vehicle with it. About 10 companies including Cofrem-Motor Gas, Weber Carburateurs, Seegaz, can transform any CX, R14 or Solara in good condition within 48 hours, using more or less sophisticated parts imported from the US or Italy for the most part. The user must obtain approval of his vehicle by the competent French administration which also certifies it as a single-fuel vehicle.

France is currently the only country which does not authorize dual LPG-gas operation, mostly in order to slow down demand. The logistics of distribution of the containers with a capacity of 56 to 118 liters of liquefied gas allowing a range of 400 to 600 kilometers is progressing slowly. Elf-Antargaz, Esso Gaz, Primagaz, Total Gaz,

URP Butagaz and a few other distributors have only installed about 350 refuelling stations. This is not many, although they are spread throughout the territory. This number will grow from 350 to 700 by the end of this year (1,500 before 1985). But nobody wishes to progress too fast, neither the oil companies who are still concentrating on their gas and diesel oil sales, nor the Finance Ministry who would lose tax income, nor even insurance companies since premiums on American and Japanese LPG cars are lower due to the fact that they are potentially 10 percent less dangerous!

6445
CSO: 3102

BRIEFS

EC PILOT PHOTOVOLTAICS PROGRAM--The European Communities Commission has decided to grant financial support to a photovoltaic generator construction project intended to demonstrate the possibility of producing electricity directly from solar energy. Solar cells offer interesting possibilities even in the northernmost regions of the Community, since they can operate not only under direct radiation from the sun, but also under diffuse lighting conditions, and even in the rain. Each member state of the Community will sponsor at least one project. The construction of pilot installations with a power of between 30 and 300 kw (never before experimented with in Europe) will be completed toward mid-1983. The most important element is the 300-kw plant to be located on an island in the North Sea, which will be the largest installation in the world to be equipped with silicon photovoltaic cells. France will have three elements:--45 kw in Rondulinu (Corsica) to be used in homes and other installations. 50 kw in Nice to be used in the airport control and management installations. 50 kw in Montpellier to power an FM television transmitter. [Text] [Paris SEMAINE DE L'ENERGIE in French 9 Feb 81 p 11] 6445

CSO: 3102

AGENCY FOR DATA PROCESSING COMPLETES FIRST YEAR

Paris AFP SCIENCES in French 5 Feb 81 pp 38-39

[Text] Paris--The Agency for Data Processing believes that there are no "blocks" to computerization. The director of the Agency for Data Processing, Mr Bernard Lorimy, told the press on 3 February that the risks of "blocks" to the computerization of society have been exaggerated.

One year after the establishment of this agency, which is subordinate to the Ministry of Industry, Mr Lorimy stated that the danger would instead be that "excessive and impulsive infatuation" of users with data processing.

He pointed out that the Agency for Data Processing is not a promotional agency; it constitutes an "official agency for guidance down the line," based on the needs of users, in regard to the spread of data processing in society. Its operations are part of the development plan for data processing applications, which was prepared at the request of the president of the republic and adopted by the Council of Ministers on 6 September 1978.

In its first year of operation, the agency examined about 400 agreements, half of which are in the process of being implemented with groups of users, trade unions and other organizations. Of a total of Fr 176 million in assistance funds, 80 percent has already been allocated.

The 1981 budget of the Agency for Data Processing is Fr 300 million. These funds will be distributed equally among three types of programs: the dissemination of sectoral applications (banking, insurance, tourism, etc.) of data processing, the creation and testing of new applications, training and support programs.

The director of the Agency for Data Processing believes that it will thus prepare the programs themselves of the Directorate of Electronic and Data Processing Industries (DIELI) under the Ministry of Industry, which is concerned with "industrial guidance" of projects. "We are providing DIELI with the viewpoint of users," he said.

With regard to training programs for data processing, Mr Lorimy noted that 400 microcomputers have already been installed in secondary schools (Operation "10,000 Microcomputers"). Another 1,600 microcomputers will be installed this year. Finally, with the opening of the 1981 school year, the first tests of data processing instruction in primary and secondary schools will be made in about 20 second- and fourth-level classes.

Provisional Income Statement of the Agency for Data Processing
in Millions of Francs

	1980 Allocation	Proposed for 1981
Ministry of Industry (Computerization of Society Fund)	110	129
Research Funds (Ministry of Industry and program contract--Secretariat of State for Research)	66	106
Posts and Telecommunications	—	70
Total	176	305

Estimates of 1981 Allocations

Technical Testing Research (Agreements)	87
Sectoral Programs (Agreements)	92
Support Programs (Agreements)	70
Support for Connected Centers, Operating Expenses	56
	305

11,915
CSO: 3102

ADVANCED-TECHNOLOGY AIRBUS: PRESENT STATUS, OUTLOOK FOR 1980'S

Stuttgart FLUG REVUE in German Feb 81 pp 26-29

[Article by Peter Hohmann: "European Council--Airbus Industrie Relies Upon Improved Technology in Competing With U.S. Aviation Giants"]

> [Text] As the European Airbus Industrie celebrated its 10th anniversary, the designers of the world's most economical passenger aircraft unveiled the mystery of the Airbus of the future. Their concept is sufficiently progressive to instill fear in their competitors. Former critics have been silenced, and admirers speak of the European model of the aviation industry.

"Tackling the future together," is the slogan which Airbus Industrie writers like to add to the list of six partner firms in their advertising brochures, albeit in small letters.

Ten years after establishing Airbus Industrie with its registered place of business in Blagnac, a suburb of Toulouse, the writers may now incorporate their slogan into the company's name plate in large letters. After 7 lean and 3 fat years, the company is now entering a new era as a manufacturer of passenger aircraft which can compete with those of their U.S. competitors in every respect.

Together, Airbus manufacturers and partners Aerospatiale, Deutsche Airbus, British Aerospace, CASA, Fokker and Belairbus with their French company have succeeded in obtaining the lion's share in the market of short- and medium-range, twin-aisle, wide-bodied aircraft: last year Airbus sold 39 planes of the A300/A310 type, Boeing sold 26 B767's and 6 B747SR's, Lockheed sold 4 L-1011-1's, and McDonnell Douglas sold 3 DC-10-10's.

It appears that their future success cannot be stopped now. Chief of the Airbus group, Bernhard Lathiere, believes that again this year the number of planes ordered will exceed the number of aircraft built. On the basis of the capacities available, the manufacture of 40 to 50 planes is anticipated. In spite of the slow order situation in the aviation industry, Lathiere bases his optimism on a simple calculation conducted by his sales director, Adam Brown, an American with a British disposition, who thinks that rain will be followed by sunshine: According to Brown's statisticians, every recession in the major industrial countries

caused by an increase in oil prices was followed by a boom in aircraft orders. After 1970, for example, when the GNP of the OECD countries had fallen to a low of 3 percent and was just beginning to recuperate, airline orders started coming in as of 1971. And when in 1975 the growth resumed following the deep recession, the aircraft manufacturers booked grandiose orders up to 1978.

Airbus Industrie has undoubtedly profited from this boom, because the Airbus as a fuel-saving aircraft surfaced at a most opportune time, and the financing of the Airbus purchase was a bargain for airlines with little capital--state bonds guaranteed the payments, and the lease of aircraft was and is part of Airbus' sales strategy. Now that the numbers have changed--and with them, the faces in management--Airbus construction in Europe is conducted according to proven U.S. examples. On the occasion of the company's anniversary, Brown enumerated the achievements:

--114 Airbuses are utilized by 20 airlines with a total of approximately 600,000 hours of flight time, some of them having 12,000 hours of flight time alone.

--On the average, only 7.9 hours daily are spent standing or rolling during the so-called block-times, while other operators calculate 11 hours of standstill or rollout.

--The technical availability of the Airbus in operation is quoted to be 98 to 99 percent. This means that the down times are practically negligible.

--292 firm orders and 157 options for Airbuses were received from 38 airlines.

In order to meet the enormous demand, which even Airbus managers can hardly believe, the partners have resolved to implement a program of massive investments this year:

--MBB will invest DM 400 million in its Hamburg operation (fuselage manufacture).

--VFW will invest DM 290 million in Bremen (fuselage manufacture).

--Aerospatiale will spend F 400 million (DM 173 million) (cockpit and final assembly).

--CASA, Madrid (elevator unit) will double its plant facilities spending 1.45 billion Pesetas (DM 37 million).

--British Aerospace (wing manufacture) will expend approximately 25 million pounds (DM 116.7 million) up to 1982, in addition to 40 million pounds (DM 186.7 million) for plant and tools for the manufacture of 98 wing units.

--Two additional Super Guppies have to be built to transport the aircraft parts from the various plants to Toulouse.

Thus, the prerequisites have been met to tackle projects of the future which have been taking shape on the drawing boards.

The designers borrowed production techniques from the U.S. manufacturers, who, like Boeing, began to utilize module-type construction years ago. This way, Boeing 727 components will also fit into a Boeing 737.

This is why in the 1980's a layman will not be able immediately to distinguish whether he is aboard an A300, the smaller A310, or the enlarged A300-600--as far as the outward appearance is concerned, the differences are minute.

The A300B2 and B4 types are already being equipped with new technology. On request, they will be equipped with the new Forward Facing Crew Cockpit (FFCC) (see page 24) for 3- or 2-member crew operation, and there will be new cargo and a combination (passenger and cargo) versions. The pilots will be able to fly the 300-seat, 165-ton Airbus with the currently most advanced Automatic Flight Control System (AFCS), which was developed by SFENA, France, in cooperation with the German Bodenseewerk and Smiths Industries, Great Britain. The AFCS will permit landings at a visibility of less than 4 football field lengths; however, it will also permit fully automatic landings at airports which have the respective equipment.

The next step into the future is undertaken by Airbus Industrie by building the smaller derivative A310 featuring 200 seats and up to 143 tons of take-off weight. The bird, which will be available as of 1983, is a shortened A300 version including lower-resistance and stronger-lift wings and newly developed, fuel-saving, lower-noise engines. All systems are monitored by microprocessors and computers: the FFCC with its clearly arranged instrument panel facilitates the crew's work; the AFCS will maximize flight performance. It approaches the runway automatically, pulls up in correcting faulty approaches and could perform a one-engine flight without pilot interference, including landing, in an emergency. Information on the systems' and flight status are displayed constantly.

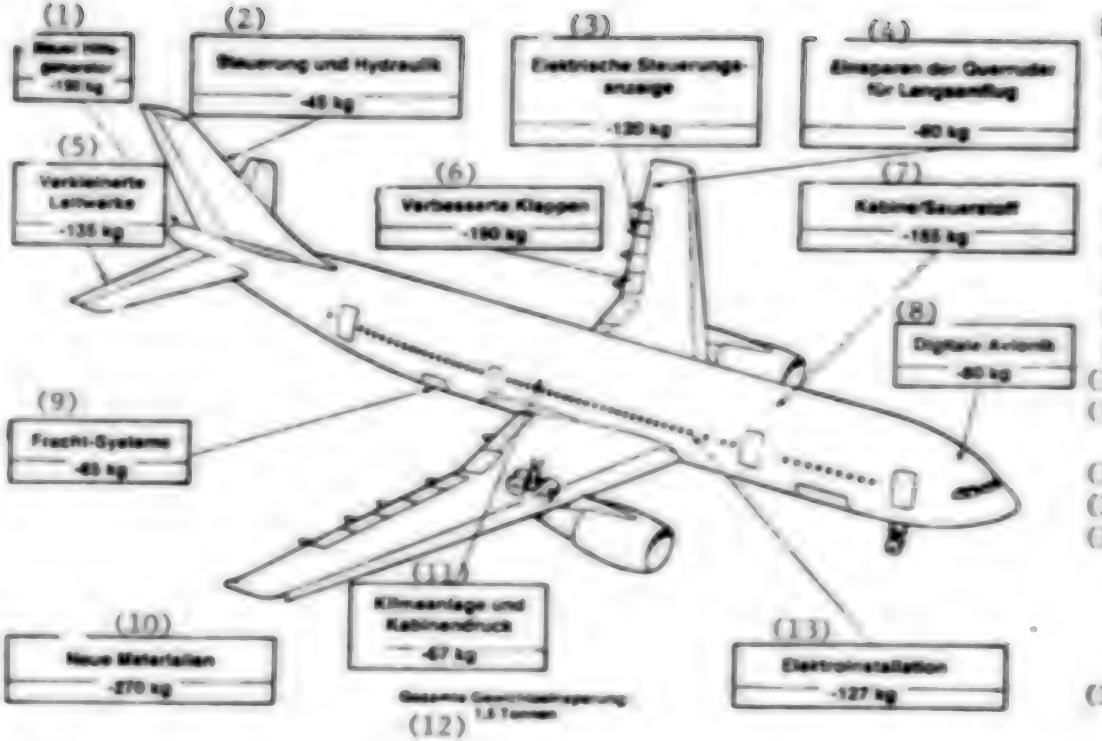
A new interior shows that the engineers discovered a heart for the passengers: the wide body and the advanced seating arrangement provide freedom of movement and more freedom of leg movement, in particular.

Another advantage: Airbus Industrie had the engines modified by the three major manufacturers, General Electric, Pratt & Whitney and Rolls-Royce. These modified engines are already used for all wide-bodied aircraft. Thus, an airlines may choose the type of engine when purchasing an A300 or A310 Airbus to match those utilized in other aircraft of its fleet. Maintenance becomes more economical, because the engine components may be interchangeable.

The third derivative of the A300 Airbus is to follow the A310 one year later: the A300-600 Airbus. This aircraft will:

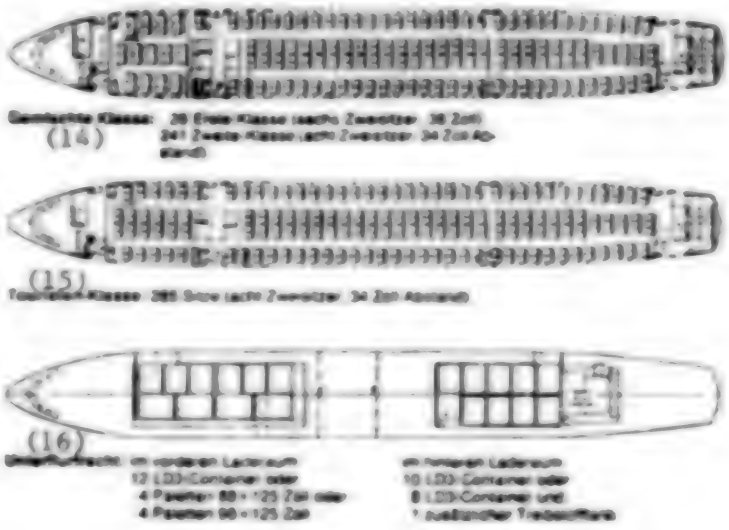
--transport more passengers and cargo over longer hauls;
--use less fuel, thus reducing the operating costs per seat by 8 percent;
--be equipped with a fully digitalized FFCC;
--feature new engines with improved thrust.

The ultima ratio of passenger aircraft lacks only one thing: Airbus Industrie cannot build it any larger, because with a maximum of 165 tons takeoff weight it has reached the load limits of the aerodynamically highly sophisticated wings.



Key:

(1) New auxiliary generator
(2) Controls and hydraulics
(3) Electrical controls displays
(4) Elimination of aileron for slow speeds
(5) Tail units reduced in size
(6) Improved flaps
(7) Cabin/oxygen
(8) Digital avionics
(9) Cargo systems
(10) New materials
(11) Air-conditioning and cabin pressure
(12) Total weight reduction: 1.5 tons
(13) Electrical installation
(14) Combination class:
26 First class (6 two-seaters, 38" apart
241 Second class (8 two-seaters, 34" apart)
(15) Tourist class: 285 seats (8 two-seaters, 34" apart)



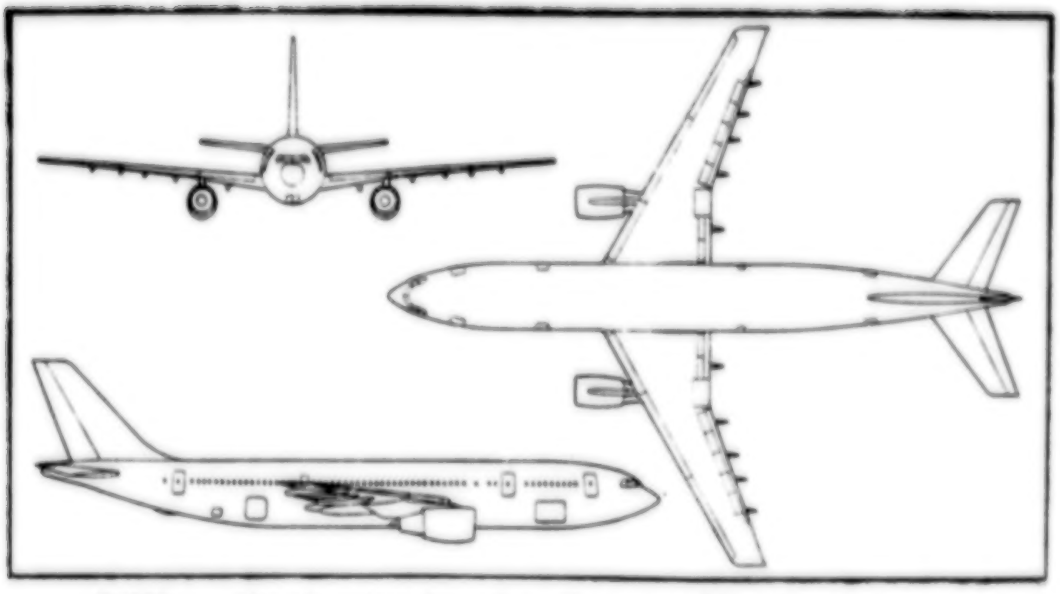
(16) Cargo underneath cabin floor

Front cargo compartment:	Rear cargo compartment:
12 LD3 containers, or	10 LD3 containers, or
4 pallets 88" x 125", or	8 LD3 containers and
4 pallets 96" x 125"	1 additional fuel tank

Technical Data

Type	A300 Airbus				A310 Airbus		A300-600 Airbus*
Version	B2-203	B4-103	B2-220	B4-120	202	220	B4-600
Engine	CF6-50C2	CF6-502C	JT90-59A	JT90-59A	CF6-80A	JT90-JR	CF6-80C1
Span	44.84 m				43.90 m		44.84 m
Length	53.62 m				46.70 m		53.55 m
Height	16.53 m				15.80 m		16.53 m
Diameter of fuselage	5.64 m				5.64 m		5.64 m
Wing area	260.00 m^2				519.00 m^2		260.00 m^2
Cabin height	2.54 m				2.54 m		2.54 m
Cabin ngth	39.15 m				33.24 m		--
Cargo hold under cabin floor	140.00 m^3				102.00 m^3		--
Maximum take-off weight	142.0 t	157.5 t	142.0 t	157.5 t	132.0 t	132.0 t	165.0 t
Deadweight	86.0 t	88.2 t	87.9 t	89.8 t	76.1 t	76.2 t	89.1 t
Fuel load	34.0 t	49.0 t	34.0 t	49.0 t	43.0 t	43.0 t	53.7 t
(Paying) passenger load	35.5 t	35.8 t	32.6 t	36.2 t	34.3 t	34.2 t	40.9 t
Maximum cruising speed	870 km/h	870 km/h	870 km/h	870 km/h	870 km/h	870 km/h	870 km/h
Take-off distance (for 925 km cruise)	269 passengers 1,650 m at sea level		269 passengers 1,430 m at sea level		234 passengers 1,170/1,350 m sea level		--
Landing distance (normal weight)	1,448 m		1,660 m		1,430 m		--
Speed of approach (normal weight)	240 kmh		237 km/h		231 km/h		--
Range	3,334 km	4,815 km	3,148 km	4,723 km	4,720 km	4,720 km	5,700 km
Maximum cargo load (A300C4)	41 t				37.6 t		
Max No of passengers	345				237		344
Engine thrust	52,200 lb	52,200 lb	53,000 lb	53,000 lb	48,000 lb	46,900 lb	56,000 lb

*Other data available



Still on the drawing board: the new A300-600 Airbus

This gap, however, is to be filled soon thereafter. Engineers are already designing an Airbus type TA9 with twin engines, which will be able to carry 25 percent more passengers and 50 percent more cargo and yet operate more economically. In order to enable Europeans to cross the Atlantic with an Airbus in the near future, a project called TA11 is on the drawing boards in Blagnac, a wide-bodied, 4-engine jet for 200 passengers.

The Airbus managers have another project in mind which the airlines have been awaiting for a long time and which would round off the family: 2 types of aircraft for 120 up to 170 passengers. The studies are termed SA1 and SA2 (abbreviation of single-aisle) and are to incorporate components of the large Airbuses. By coordinating the joint European Airbus efforts, this project may be successfully launched in the mid-80's, for the French alone did not succeed in building an aircraft of this size ready for the market.

How the New Airbus Cockpit Will Facilitate the Crew's Job

In the future, Airbuses will be equipped with the Forward Facing Crew Cockpit (FFCC). There will be no specific instrument panel on the side to be operated by the flight engineer; instead, all instruments are integrated into panels in front of the two pilots, the middle console and above the crew's heads (overhead panel). All three cockpit members face forward and can reach the levers, switches and pushbuttons for which they are responsible.

All prescribed instruments, which all aircraft are equipped with, exist two- and threefold: engine supervision, controls, navigation. There are always multiple displays and switches for each system of these functions, and the more comprehensive, the equipment became in the past, the more crowded the pilots' and flight engineer's panels became.

Today, Airbus technology utilizes circuit and microprocessor miniaturization. In the FFCC, conventional instruments are used for the most important functions. All multiple and additional instruments incorporate modern electronics; artificial horizons, for example, and radio navigation displays may be read from screens with several selectable functions--larger and more accurate. The flight path, which is entered by means of the computer, is followed automatically by the automatic pilot and is displayed on the screen.

The system by means of which all errors are listed by a memo computer and displayed in system images on another screen, is a new one. For the crew, this is a modern checklist, which diligently monitors all in-flight information.

If an error occurs, a gong will sound, and the word "fault" will be displayed on one of the many pushbuttons. The screens show the details and indicate what is to be done. When the crew reacts and finds a solution, the button will be switched to "Off." The computer will memorize the errors during the entire flight, including problem phases.

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